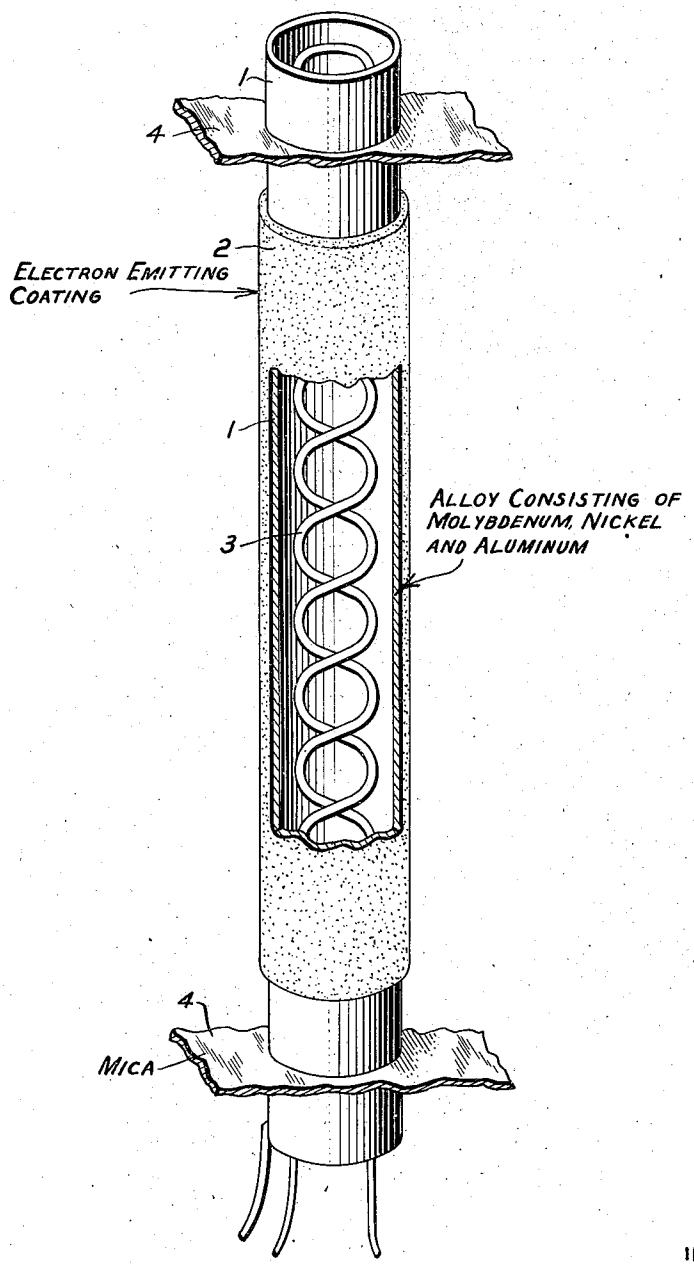
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CATHODES FOR ELECTRIC DISCHARGE TUBES

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CATHODE FOR ELECTRIC DISCHARGE TUBES

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2 Claims. (Cl. 250—27.5)

1

This invention relates to cathodes for electric discharge tubes, particularly to alloys for cathodes heated either directly or indirectly.

The principal object of the invention is to provide an improved oxide coated cathode and materials well suited for cathodes in which the dissipation of heat at the extremities has to be very small. According to the invention, for this purpose a cathode to be heated directly, or a cathode sleeve to be heated indirectly, and having a fastening or current supply tab, consists of an alloy of molybdenum on the one hand, and nickel, cobalt or iron on the other hand with the addition of one or more other components, the percentage of molybdenum atoms being at least 10 if alloys consisting of two components are concerned, such as molybdenum with iron, nickel or cobalt, and at least 5 if use is made of alloys comprising more than two components. The upper limit to be maintained in both cases is for molybdenum 35 per cent of atoms.

The component to be added to these alloys preferably consists of one or more of the elements aluminum, silicon, manganese, magnesium, zirconium or thorium. As has been found by applicant, very good results can be obtained with a three-component alloy consisting of 9 per cent of aluminum atoms, 13 per cent of molybdenum atoms and 78 per cent of nickel atoms, or with an alloy composed of 16 per cent of iron atoms, 14 per cent of molybdenum atoms and 70 per cent of nickel atoms, since the alloys according to the invention may contain not only molybdenum and one of the components iron, nickel or cobalt, but also two of the last mentioned elements.

A very important advantage of the alloys according to the invention is that, in addition to being properly workable, they exhibit great hardness so that an improvement is obtained not only due to the conduction of heat itself being smaller than that of the materials previously used, but also because these materials, due to their great hardness which appears to be greatly heat proof under the influence of the high melting molybdenum, may be thinner than the known materials when used for the same purpose. For the alloys aluminum-molybdenum-nickel and iron-molybdenum-nickel which are mentioned above, the hardness is approximately one and a half times as great as that of iron-nickel or chrome-nickel alloys whilst the heat conductive capacity is smaller. With regard to the iron-nickel and chrome-nickel alloys here mentioned, the materials according to the present invention have in addition the advantage that they give off less gas

2

than the known alloys, such as iron-nickel and chrome-nickel.

Applicant has found that the heat conductive capacity of materials according to the invention can be made small and that, on the other hand, these materials are properly workable and can be used as bodies of very small thickness. The workability particularly plays a part in the manufacture of cathode bodies for cathodes to be heated indirectly which may be obtained from the material according to the present invention, for example by rolling.

The combination of rigidity and small heat conductive capacity renders the above described materials also highly adapted to be used for bodies which serve at the same time as fastening and current supply members for a cathode to be heated indirectly. Most generally also the construction of this cathode is simplified by utilizing the materials according to the present invention, since under certain conditions the centering of the cathode may be effected without special means by introducing the cathode body itself through an aperture in a plate consisting of mica or similar material and supporting the cathode body in this mica without excessive loss of heat at the contact surface between the cathode and the mica. Also other modes of fastening are possible with the use of the cathode according to the invention.

The accompanying drawing shows one illustrative embodiment of my invention in a thermionic cathode of the indirectly heated type having a tubular cathode sleeve 1 made of an alloy consisting of molybdenum, nickel and aluminum, with an electron emitting coating 2 of the conventional barium and strontium oxides on and in contact with the cathode sleeve. A conventional reverse coiled heater 3 supplies heat to the cathode, which may be held in place by the conventional top and bottom spacers or insulators 4, usually of mica, and each having a hole into which the end of the cathode sleeve 1 fits.

I claim:

1. An oxide coated thermionic cathode having a body consisting of an alloy of molybdenum, nickel, and a metal selected from the group consisting of aluminum, silicon, manganese and magnesium, the molybdenum constituting from 5 per cent to 35 per cent of the atoms of the total alloy and the nickel constituting the major part of the balance, and a coating of alkaline earth metal oxides on and in contact with said body.

2. A thermionic cathode having an alloy body consisting, by number of atoms, of 9% aluminum, 13% molybdenum, and 78% nickel and a coating

of alkaline earth metal oxides on and in contact with said body.

GERRIT SCHMIDT.

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